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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE PATENT APPLICATION OF:

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INTERNATIONAL APPLICATION NO.
PCT/AT/01/00150

INTERNATIONAL FILING DATE:
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FOR: DEVICE FOR ATOMIZING AND COMMINUTING LIQUID MELTS

EXAMINER: UNKNOWN
GROUP ART UNIT: UNKNOWN

Commissioner for Patents
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PRELIMINARY AMENDMENT

Prior to calculation of the filing fee and examination of this new U.S. National Stage Application filed under 35 U.S.C. § 371, of the International Application PCT/AT01/00150, Applicant respectfully submits the following Amendments and Remarks to be entered into the patent application identified above, and earnestly requests that the Examiner pass this application to allowance.

AMENDMENTS:

IN THE CLAIMS:

Please amend the application by canceling original claims 1 – 11, and replacing them with the following new claims 12 - 44, renumbered herein as claims 1 - 33. These new claims 1 – 33, in clean form, are provided on the following pages.

CLAIMS

1. A device for atomizing and comminuting liquid slag melts, the device having a slag tundish (6) having a bottom (5) and an outlet (8) connected to an expansion or cooling chamber, the device further comprising:

a propellant gas lance nozzle with a mouth positioned to open into the outlet; and a tubular underflow weir (3) immersed in said liquid slag and surrounding the propellant gas lance nozzle, characterized in that the width of a gap between a lower edge of the underflow weir (3) and the tundish bottom (5) is smaller than 20% of a clear width (D) of the outlet (8); wherein

the tundish bottom (5) in the region between the lower edge of the overflow weir (3) and the outlet (8) is configured in a funnel shape; and

the propellant gas lance nozzle (1) is configured for the use of supercritical vapor to form an underexpanded free jet (11) in an interior portion of the melt jet, with the gas flow at the nozzle mouth having about sonic speed.

2. The device according to claim 1, wherein the width of a gap between a lower edge of the underflow weir (3) and the tundish bottom (5) is smaller than 15% of a clear width (D) of the outlet (8).

3. The device according to claim 1, characterized in that the angle of inclination (α) of the funnel-shaped region of the tundish bottom is smaller than 30° relative to a cross sectional plane of the tundish outlet (8).

4. The device according to claim 1, wherein the angle of inclination (α) of the funnel-shaped region of the tundish bottom is smaller than approximately 20° relative to a cross sectional plane of the tundish outlet (8).

5. The device according to claim 1, characterized in that the tundish (6) comprises heating elements (15) to heat with medium-frequency current, and that at least the underflow weir (3) is made of an electrically conductive material.

6. The device according to claim 1, characterized in that the tundish (6) comprises heating elements (15) to heat with medium-frequency current, and that at least the underflow weir (3) is made of one of C, SiC, ZrO_2 and ZrO_2.MgO.

7. The device according to claim 1, characterized in that the outlet region (8) of the tundish (6) is made of SiC, $A1_20_3$, ZrO_2, and/or ZrO_2.MgO.

8. The device according to claim 1, characterized in that the tundish (6) is made of one of graphite and SiC.

9. The device according to claim 1, characterized in that the propellant gas lance nozzle (1) is adapted for use with a propellant vapor having a temperature between 600° and 1250°C and a pressure between 2 and 5 bars.

10. The device according to claim 1, characterized in that the slag outlet (8) of the tundish (6), following the funnel-shaped inlet, is designed to be one of hollow-conical and hollow-cylindrical over an axial length corresponding to 0.6 to 1.1 times the clear diameter (D) of the outlet (8).

11. The device according to claim 3, characterized in that the tundish (6) further comprises heating elements (15) for use with medium-frequency current, and wherein the underflow weir (3) is made of an electrically conductive material.

12. The device according to claim 3, characterized in that the tundish (6) further comprises heating elements (15) for use with medium-frequency current, and wherein the underflow weir (3) is made of one of C, SiC, ZrO_2 and ZrO_2.MgO.

13. The device according to claim 3, characterized in that the outlet region (8) of the tundish (6) is made of SiC, $A1_20_3$, ZrO_2 and/or ZrO_2.MgO.

14. A device according to claim 3, characterized in that the tundish (6) is made of one of graphite and SiC.

15. The device according to claim 3, characterized in that the propellant gas lance nozzle (1) is adapted for use with a propellant vapor having a temperature between 600° and 1250°C and a pressure between 2 and 5 bars.

16. The device according to claim 3, characterized in that the slag outlet (8) of the tundish (6), following the funnel-shaped inlet, is designed to be one of hollow-conical and hollow-cylindrical over an axial length corresponding to 0.6 to 1.1 times the clear diameter (D) of the outlet (8).

17. The device according to claim 5, characterized in that the outlet region (8) of the tundish (6) is made of SiC, $A1_20_3$, ZrO_2 and/or ZrO_2.MgO.

18. The device according to claim 5, characterized in that the tundish (6) is made of one of graphite and SiC.

19. The device according to claim 5, characterized in that the propellant gas lance nozzle (1) is adapted for use with a propellant vapor having a temperature between 600° and 1250°C and a pressure between 2 and 5 bars.

20. The device according to claim 5, characterized in that the slag outlet (8) of the tundish (6), following the funnel-shaped inlet, is designed to be one of hollow-conical and hollow-cylindrical over an axial length corresponding to 0.6 to 1.1 times the clear diameter (D) of the outlet (8).

21. The device according to claim 11, characterized in that the outlet region (8) of the tundish (6) is made of SiC, $A1_20_3$, ZrO_2 and/or ZrO_2.MgO.

22. The device according to claim 11, characterized in that the tundish (6) is made of one of graphite and SiC.

23. The device according to claim 11, characterized in that the propellant gas lance nozzle (1) is adapted for use with a propellant vapor having a temperature between 600° and 1250°C and a pressure between 2 and 5 bars.

24. The device according to claim 11, characterized in that the slag outlet (8) of the tundish (6), following the funnel-shaped inlet, is designed to be one of hollow-conical and hollow-cylindrical over an axial length corresponding to 0.6 to 1.1 times the clear diameter (D) of the outlet (8).

25. The device according to claim 10, characterized in that the outlet (8) widens conically following the hollow-conical or hollow-cylindrical region.

26. The device according to claim 16, characterized in that the outlet (8) widens conically following the hollow-conical or hollow-cylindrical region.

27. The device according to claim 20, characterized in that the outlet (8) widens conically following the hollow-conical or hollow-cylindrical region.

28. The device according to claim 24, characterized in that the outlet (8) widens conically following the hollow-conical or hollow-cylindrical region.

29. A method for atomizing and comminuting liquid slag melts, comprising the steps:

introducing slag into a slag tundish (6) having an outlet connected to an expansion or cooling chamber, the tundish having a propellant gas lance nozzle positioned to open into the outlet; and

the tundish further having a tubular underflow weir surrounding the propellant gas lance nozzle, and wherein the width of a gap between the lower edge of the underflow weir (3) and a tundish bottom (5) is smaller than 20%, preferably smaller than 15%, of a clear width (D) of the outlet (8); and having the tundish bottom (5) in the region between the lower edge of the overflow weir (3) and the outlet (8) designed in a funnel shape;

melting the slag to a liquid state;

immersing the underflow weir (3) into the liquid slag; and

injecting supercritical vapor through the propellant gas lance nozzle (1) to form an underexpanded free jet (11) in the interior of the melt jet, with the gas flow speed at the nozzle mouth at about sonic speed.

30. The method according to claim 29, comprising the further step of heating the tundish (6) using heating elements (15) adapted to utilize medium-frequency current.

31. The method according to claim 29, comprising the further step of introducing the propellant vapor at a temperature between 600° and 1250°C and a pressure between 2 and 5 bars.

32. The method according to claim 29, comprising the further step of adding a flux, such as, *e.g.*, CaF_2, to the liquid slags to enhance their rheologic properties.

33. The method according to claim 31, comprising the further step of adding a flux, such as, *e.g.*, CaF_2, to the liquid slags to enhance their rheologic properties.

REMARKS:

By this Amendment, the Applicant has canceled originally filed Claims 1 through 11, and added new Claims 12 through 44, renumbered herein as Claims 1 through 33, to more clearly define the subject matter of the invention in compliance with U.S. Patent Office rules. Applicant respectfully submits that the application is in condition for allowance.

The Commissioner is hereby authorized to charge any additional fees associated with this communication to our Deposit Account No. 50-0305.

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The Examiner is encouraged to call the undersigned at the direct number (312) 845-3919 with any questions that arise in connection with this application.

Respectfully submitted,

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